

Storage Area Network (SAN)

*Network Services
April 2017*

Rate

Monthly per GB of Replicated Data	\$0.20
Debit Code	246

Service Description

This service provides a storage area network (SAN) for server-based systems. A SAN consists of storage devices and servers connected by high speed networks, usually fiber optic channels. Connectivity, reliability and switching capabilities are key characteristics of a SAN. The purpose of a SAN is to provide data storage that is scalable and serves multiple applications.

The server-based SAN includes three storage service options:

- 1. Access via Internet Small Computer Systems Interface (iSCSI) Connection
- 2. Access via Host Bus Adapter (HBA) Connection
- 3. Virtual Server (a partition within the SAN storage unit)

In combination, these three storage service options will support many potential configurations. An agency can connect its server to the SAN storage unit through the state's network using the common iSCSI network interface card. Data transfer will take place at local area network speeds for servers on the state's campus network. Faster transfer rates can be achieved by installing a HBA adapter in the agency's server and connecting it to the SAN storage unit via fiber optic cable. This option requires an initial investment in the HBA adapter and purchase or lease of fiber. The server with the HBA adapter must be located within the same data center as the SAN storage unit. Another option is to pay for a virtual server within the SAN unit instead of maintaining a physically separate server.

Service Details

The Office of the CIO SAN provides disk space in the State's Core Data Centers. The two sites are linked for purposes of data replication at a speed of 1 gigabit per second (gbps). The current replication capacity has been tested and verified by a field engineer assigned by the equipment vendor.

Storage is measured and billed per gigabyte, which is actually 2 bytes raised to the 30th power, more commonly expressed as 2³⁰, or 1,073,741,824 bytes.

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Office of the CIO SAN disk space is presented to specific servers within the Core Data Centers. By special arrangement, existing servers at the remote DR site may also connect to the SAN fabric. These servers will belong to entities partnering with the Office of the CIO to provide remote physical facilities. They will be Office of the CIO designated core components regarded as mission critical to keep the State infrastructure functioning in the event of an outage. The overriding purpose of any given remote SAN is to preserve exact copies of primary site data.

The server owner is responsible for purchasing and installing appropriate server hardware for SAN connectivity. At the request of the server owner, the Office of the CIO can assign an analyst to assist with physical installation of internal server devices. The OCIO will provide support in any case where the client is not comfortable or not available to perform hardware maintenance. Please refer to the OCIO website, under "All Services" for rates and fees:

<http://www.cio.nebraska.gov/services/index.html>

The necessary cables for SAN connectivity will be supplied and installed by Core Data Center personnel. The Office of the CIO can, upon request, assist with software configuration of the server(s) for the connecting devices if necessary. Management of the SANs themselves will be performed by the Office of the CIO or engineers assigned by the equipment vendor.

Two methods of connecting to the Office of the CIO SAN are available: fiber optic multimode connections, and iSCSI connections. Access to SAN storage is deemed mission critical. All connections are made in redundant pairs. No client servers will make single connections to the SAN.

The first SAN connection method, via multimode fiber, is implemented on the server side by host bus adapters (HBAs). The Office of the CIO has experience with the most commonly used multimode fiber HBAs, namely Qlogic and Emulux. HBAs will be purchased and physically installed by the server owner, and the fiber optic cable will be provided by the Office of the CIO. See the OCIO website 'All Services' for rates and fees:

<http://www.cio.nebraska.gov/services/index.html>

The second connection method, via iSCSI, is implemented on the server side by gigabit Ethernet adapter pairs. SCSI commands are transmitted over two dedicated TCP/IP subnetworks. Ideally, Ethernet adapters used for iSCSI connections should utilize TCP/IP Offload Engines (TOE). This functionality ensures that the server CPU(s) are not taxed by data transmission to or from the SAN. As equipment for faster transmission speeds becomes available we expect iSCSI speeds to increase accordingly. To accommodate faster speeds in the future, the server owner would need to upgrade Ethernet adapters as desired.

As with fiber connections, iSCSI connections are dual-pathed, meaning the two iSCSI ports on the server will connect to two different virtual Local Area Networks (vlans) on two different physical switches. In a rack without high port density requirements or multiple Ethernet switches, the second physical connection may be made by the Office of the CIO to a switch in an adjacent cabinet. As

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detailed in the Office of the CIO Core Data Center SLA, all switch equipment belongs to and is managed by the Office of the CIO and it will be installed above the 32U mark of the cabinet(s).

The Office of the CIO SAN is highly configurable with many different options. The Office of the CIO will determine RAID levels, drive types, and other configuration specifics as deemed fit for purposes of providing optimal service to its clients. Metrics of SAN performance can be provided upon request should any question of response times arise.

The SAN Service includes:

- Storage of a very high quality in terms of speed and reliability
- Storage that is shareable across systems and scalable with real time changes in the amount of storage allocated to a system.
- Storage Level Protection (short term nightly snapshots; ex. 3 days).
- System monitoring that can provide information regarding use of storage allocated, respond to error messages and guarantee the documentation of response times.
- Connectivity between server and the SAN.

The SAN Service does NOT include:

- Records retention
- File Level Backup – see Backup Service for details
- HBA adapter
- Server hosting fees for locating a server
- Archiving

Benefits

- Fully scalable storage. This includes real time changes to the amount of storage available for a specific system or user
- The “snapshot” tool on SAN can also be used to store and create copies of an operating system which greatly increases the speed of restoring a system.
- Server consolidation
- Greater reliability through multiple layers of redundancy
- Creating data for systems testing has never been easier!
- Connecting to mirrored systems for a high standard of disaster recovery.

Service Hours, Availability and Reliability

The Office of the CIO SANs are mission critical devices, and as such will be run on a 24 x 7 basis. All disks are in RAID configurations which are controlled by multiple storage processors. Any scheduled maintenance will be arranged in advance via Change Management. Downtime will be kept to an absolute minimum.

Responsibilities

The Office of the CIO will be responsible for SAN operation and all connecting network components. The client will be responsible for server side hardware and software.

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Cost and Billing Information

The Office of the CIO uses a system of Billing Accounts, Job Codes and Work Orders for authorizing work and tracking costs for specific projects. The customer may designate which job code and work order to use or request a new job code and work order. Contact the Office of the CIO for assistance with developing an accounting structure that meets the needs of the agency.

Customer Support and escalation

Support is available 24 x 7 by calling the Office of the CIO Service Desk (402- 471-4636). The on-call staff will identify the problem and the appropriate people necessary to address the issue. During regular office hours (7 a.m. – 6 p.m.) the Service Desk will route the call to the appropriate technical team. During off-hours the call will go to the Office of the CIO Operations personnel who will log the call and contact on-call members of the appropriate technical team.

For further information, please contact:

Office of the CIO Service Desk
cio.help@nebraska.gov
402-471-4636 or 800-982-2468